

What is claimed is:

1. A method of separating a solid phase and a liquid phase in an oil-based mud comprising the step of:

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(i) contacting said oil-based mud with a water-in-oil emulsion comprising a polymer derived from at least one water-soluble monomer, wherein said polymer is not dissolved prior to contact with said oil-based mud;

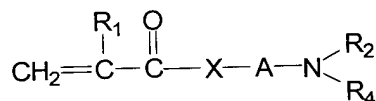
(ii) mixing said water-in-oil emulsion and said oil-based mud;

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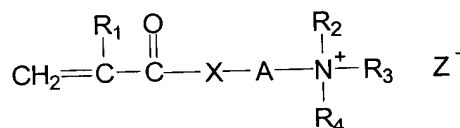
(ii) separating the solid phase and the liquid phase.

2. The method of claim 1, wherein said monomer is a water-soluble vinyl monomer.

15 3. The method of claim 1, wherein said at least one water soluble monomer is selected from (alkyl)acrylamide, (alkyl)acrylic acid, N-vinylpyrrolidone, N-vinylacetamide, N-vinylformamide, acrylonitrile, fumaric acid, crotonic acid, maleic acid, hydroxyalkyl methacrylates, 2-acrylamido-2-alkylsulfonic acids wherein the alkyl group contains 1 to 6 carbon atoms, styrene sulfonic acids; and salts of any of the
20 foregoing thereof; or monomers having the structure of formulas I, II or III

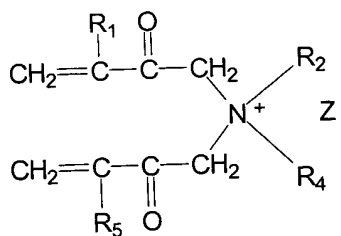


Formula I



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Formula II



Formula III

- wherein R₁, R₂, and R₅ are each independently hydrogen or a C₁ to C₆ alkyl; R₃ and R₄ are each independently hydrogen, a C₁ to C₁₂ alkyl, aryl, arylalkyl or hydroxyethyl; and R₂ and R₄ or R₂ and R₃ can combine to form a cyclic ring containing one or more hetero atoms; Z is the conjugated base of an acid, X is oxygen or -NR₆ wherein R₆ is hydrogen or a C₁ to C₆ alkyl; and A is a C₁ to C₁₂ alkylene.
4. The method of claim 2, wherein said at least one water-soluble vinyl monomer is selected from the group consisting of (alkyl)acrylamide, (alkyl)acrylic acid and its salts and vinyl sulfonic acid.
5. The method of claim 3, wherein said polymer is a copolymer of an (alkyl)acrylamide monomer and at least one second monomer selected from N-vinylpyrrolidone, N-vinylacetamide, N-vinylformamide, acrylonitrile, acrylic acid, methacrylic acid, ethylacrylic acid, fumaric acid, crotonic acid, maleic acid, hydroxyalkyl methacrylates, 2-acrylamido-2-alkylsulfonic acids wherein the alkyl group contains 1 to 6 carbon atoms, styrene sulfonic acids, vinyl sulfonic acid; and salts of any of the foregoing thereof; or monomers of Formulas I, II or III.
6. The method of claim 3, wherein said polymer is a copolymer of (meth)acrylamide and at least one second monomer selected from the group consisting of N,N-dimethylaminoethyl(meth)acrylate or its salts, quaternary N,N-dimethylaminoethyl(meth)acrylates, tertiary or quaternary N,N-dimethylaminopropyl acrylamides, tertiary or quaternary N,N-dimethylaminomethyl acrylamides and diallyl dimethyl ammonium halides.
7. The method of claim 1, wherein said polymer is anionic and is derived by copolymerization of (meth)acrylamide and (meth)acrylic acid.

8. The method of claim 1, wherein said polymer is anionic and is derived by hydrolysis.
- 5 9. The method of claim 1, wherein said polymer is branched or crosslinked.
10. The method of claim 1, wherein the concentration of said polymer in said water-in-oil emulsion is about 10% to about 70% by weight based on the total weight of the emulsion.
- 10 11. The method of claim 1, wherein said water-in-oil emulsion is pre-dispersed with oil before contacting with the oil-based mud.
12. The method of claim 11, wherein the concentration of said polymer in said water-in-oil emulsion is about 0.1% to about 10% by weight based on the total weight of the emulsion.
- 15 13. The method of claim 1, further comprising the addition of an emulsifier, surfactant or optionally water.
- 20 14. The method of claim 13, wherein said surfactant is a sulfosuccinates and/or a sulfosuccinamate.
15. The method of claim 14, wherein said sulfosuccinates is dioctylsulfosuccinate, and said sulfosuccinamate is dicarboxyethyl octadecylsulfosuccinamate, or mixtures thereof.
- 25 16. The method of claim 13, wherein said the oil-based mud is contacted with the emulsifier, surfactant or optionally water prior to contact with the water-in-oil emulsion.
- 30 17. The method of claim 1, wherein said separating the solid phase and the liquid phase is conducted by mechanical or gravitational separation.

18. The method of claim 17, wherein said mechanical separation is conducted by a centrifuge, cyclone, pressure filtration or vacuum assisted filtration, and wherein said gravitational separation is conducted by a clarifier, thickener or continuous countercurrent decantation.

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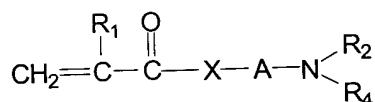
19. The method of claim 1, wherein said mixing is conducted using a flow mixer, in-line mixer, gas agitation or mechanical mixer.

20. The method of claim 11, wherein said pre-dispersed oil is kerosene, diesel,

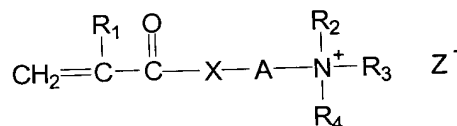
10 paraffin blends, internal olefins or C₁₆-C₁₈ alkene blends.

21. The method of claim 1, wherein said oil-based mud is an oil-based drilling mud.

15 22. The method of claim 21, wherein said at least one water soluble monomer is selected from (alkyl)acrylamide, (alkyl)acrylic acid, N-vinylpyrrolidone, N-vinylacetamide, N-vinylformamide, acrylonitrile, fumaric acid, crotonic acid, maleic acid, hydroxyalkyl methacrylates, 2-acrylamido-2-alkylsulfonic acids wherein the alkyl group contains 1 to 6 carbon atoms, styrene sulfonic acids; and salts of any of the
20 foregoing thereof; or monomers having the structure of formulas I, II or III

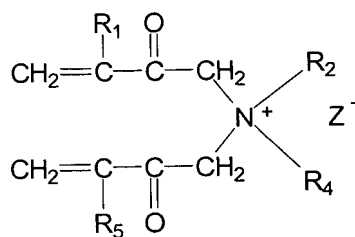


Formula I



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Formula II



Formula III

wherein R₁, R₂, and R₅ are each independently hydrogen or a C₁ to C₆ alkyl; R₃ and
 5 R₄ are each independently hydrogen, a C₁ to C₁₂ alkyl, aryl, arylalkyl or hydroxyethyl;
 and R₂ and R₄ or R₂ and R₃ can combine to form a cyclic ring containing one or more
 hetero atoms; Z is the conjugated base of an acid, X is oxygen or -NR₆ wherein R₆ is
 hydrogen or a C₁ to C₆ alkyl; and A is a C₁ to C₁₂ alkylene.

10 23. The method of claim 21, wherein said at least one water-soluble vinyl
 monomer is selected from the group consisting of (alkyl)acrylamide, (alkyl)acrylic
 acid and its salts and vinyl sulfonic acid.

24. The method of claim 22, wherein said polymer is a copolymer of an
 15 (alkyl)acrylamide monomer and at least one second monomer selected from N-
 vinylpyrrolidone, N-vinylacetamide, N-vinylformamide, acrylonitrile, acrylic acid,
 methacrylic acid, ethylacrylic acid, fumaric acid, crotonic acid, maleic acid,
 hydroxyalkyl methacrylates, 2-acrylamido-2-alkylsulfonic acids wherein the alkyl
 group contains 1 to 6 carbon atoms, styrene sulfonic acids, vinyl sulfonic acid; and
 20 salts of any of the foregoing thereof; or monomers of Formulas I, II or III.

25. The method of claim 21, wherein said polymer is a copolymer of
 (meth)acrylamide and at least one second monomer selected from the group
 consisting of N,N-dimethylaminoethyl(meth)acrylate or its salts, quaternary N,N-
 25 dimethylaminoethyl(meth)acrylates, tertiary or quaternary N,N-dimethylaminopropyl
 acrylamides, tertiary or quaternary N,N-dimethylaminomethyl acrylamides and diallyl
 dimethyl ammonium halides.

26. A composition comprising an oil-based mud with a water-in-oil emulsion comprising a polymer derived from at least one water-soluble monomer, wherein said polymer is not dissolved prior to contact with said oil-based mud.
- 5 27. The composition of claim 26, further comprising an emulsifier, surfactant and optionally water.
28. The composition of claim 26, wherein said composition is well-dispersed.